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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/833,084	04/10/2001	Ibrahim Abdulhalim	11547 M-10703 US	8866

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EXAMINER

SMITH, ZANDRA V

ART UNIT	PAPER NUMBER
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2877

DATE MAILED: 06/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/833,084	Applicant(s) ABDULHALIM ET AL.	
	Examiner Zandra V. Smith	Art Unit 2877	<i>AW</i>

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-118 is/are pending in the application.
 4a) Of the above claim(s) 1-20, 42, 43, 53, 54 and 88-118 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 21-23, 27-31, 33, 36, 42-44, 47, 55-59, 64-69, 71, 73-76, 78-81 and 83-87 is/are rejected.
- 7) ☒ Claim(s) 24-26, 32, 34, 35, 37-41, 45, 46, 48-52, 60-63, 70, 72, 77 and 82 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of Group III in the reply filed on 25 March 2004 is acknowledged.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 21-22, 27-31, 55-59, 64-68, 71, 73-76, 78-81, and 83-87, are rejected under 35 U.S.C. 102(b) as being anticipated by *Bareket (6,023,338)*.

As to **claim 21**, Bareket provides an overlay alignment measurement system, comprising:
illuminating the overlying periodic structures with radiation (col. 5, lines 42-48);
detecting diffracted radiation from the illuminated portions of the periodic structures (col. 6, lines 5-10); and
determining misalignment between the structures from the output signals (col. 6, lines 10-17 and col. 7, lines 7-11).

As to **claim 22**, Bareket discloses everything claimed, as applied above, in addition a comparison is made to a calibration signal (col. 7, lines 23-32).

As to **claim 27**, Bareket discloses everything claimed, as applied above, in addition the incident radiation is normal and the diffracted radiation includes positive and negative first-order diffraction (see fig.2 or 7a and col. 10, lines 10-20).

Art Unit: 2877

As to **claims 28-30**, Bareket discloses everything claimed, as applied above, in addition calculated derived signals contain information related to phase and differential phase (col. 7, lines 53-68 and col. 8, lines 4-15).

As to **claim 31**, Bareket discloses everything claimed, as applied above, in addition a neutral polarization angle is provided (col. 6, lines 48-55) and determining misalignment includes comparison of measured and reference signals (col. 6, line 65-col. 7, line 12).

As to **claims 55, 74 and 84-87**, Bareket provides an overlay alignment measurement system, comprising:

providing a measurement site including two regions located above one another in two different layers, the regions containing structures of known periodicity (col. 4, lines 1-8 and lines 35-45)

illuminating with optics the overlying periodic structures with radiation (col. 5, lines 42-48);

detecting diffracted radiation from the illuminated portions of the periodic structures (col. 6, lines 5-10); and

determining misalignment (shift) between the structures from the output signals (col. 6, lines 10-17 and col. 7, lines 7-11).

As to **claims 56 and 75**, Bareket discloses everything claimed, as applied above, in addition the grating patterns are identical, therefore they have the same period (col. 3, lines 56-57).

Art Unit: 2877

As to **claims 57-59, 69, 76, and 79** Bareket discloses everything claimed, as applied above, in addition at least one additional site is provided at right angles and additional sites in one of the layers (see fig. 2 and col. 4, lines 30-55).

As to **claims 64 and 78**, Bareket discloses everything claimed, as applied above, in addition calculated derived signals contain information related to phase and differential phase (col. 7, lines 53-68 and col. 8, lines 4-15).

As to **claims 65, 67 and 80**, Bareket discloses everything claimed, as applied above, in addition different polarization states are used (col. 5, lines 45-50).

As to **claims 66 and 81**, Bareket discloses everything claimed, as applied above, in addition the patterned structures are two-dimensional (see fig. 1b).

As to **claims 68 and 83**, Bareket discloses everything claimed, as applied above, in addition the sample is a semiconductor wafer (col. 1, lines 65).

As to **claim 71**, Bareket discloses everything claimed, as applied above, in addition the data is analyzed in association with a database (col. 7, lines 8-40).

As to **claim 73**, Bareket discloses everything claimed, as applied above, in addition radiation is directed normally to the site (see fig. 2).

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 33 are rejected under 35 U.S.C. 102(e) as being anticipated by *Nikoonahad et al.* (US 6,710,876 B1).

Art Unit: 2877

As to **claim 33**, Nikoonahad discloses a metrology system using optical phase, comprising:

a source providing polarized light to illuminate interlaced periodic structures (col. 7, lines 5-10);

an analyzer (118, col. 7, line 32); at least one detector (52, 54, col. 7, line 43) and a signal processor to determine misalignment between the structures (140).

As to **claim 36**, Nikoonahad discloses everything claimed, as applied above, in addition modulators provide relative motion (col. 7, lines 13-15).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over ***Bareket (6,023,338)***.

As to **claim 23**, Bareket discloses everything claimed, as applied above, with the exception of the reference signal being in a database, however since the computer performs and control measurement and calculations, it would have been obvious to one having ordinary skill in the art at the time of invention to include the reference signal in a database as a means to provide an updated and accurate signal for comparison.

Art Unit: 2877

Claims 44, 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Nikoonahad et al. (US 6,710,876 B1)*.

As to **claim 44**, Nikoonahad discloses a metrology system using optical phase, comprising:

a source providing polarized light to illuminate interlaced periodic structures (col. 7, lines 5-10);

an analyzer (118, col. 7, line 32); at least one detector (52, 54, col. 7, line 43) and a signal processor to determine misalignment between the structures (140). Although, Nikoonahad is silent to a deposition unit, it is well known that a deposition unit may be used to create a pattern on a surface of a wafer and it would have been obvious to one having ordinary skill in the art at the time of invention to provide a deposition unit to create the marks on the surface to ensure that the layers are properly aligned.

As to **claim 47**, Nikoonahad discloses everything claimed, as applied above, in addition modulators provide relative motion (col. 7, lines 13-15).

Allowable Subject Matter

Claims 24-26, 32, 34-35, 37-41, 45-46, 48-52, 60-63, 70, 72, 77, and 82 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the prior art of record, taken alone or in combination, fails to disclose or render obvious, determining ellipsometric parameters, detection of zero-order diffraction, comparing the measured signal with

Art Unit: 2877

the reference signal for polarization angles within five degrees of the neutral polarization angle, a first analyzer to detect positive first-order diffracted light and second analyzer to detect negative first-order diffracted light, or determining lateral shift as a function of wavelength, measuring at different angles, in combination with the rest of the limitations of claim.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Everett et al. (5,808,742).

Fax/Telephone Information

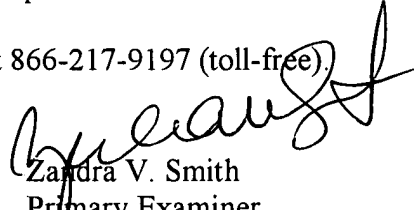
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zandra V. Smith whose telephone number is (571) 272-2429.

The examiner can normally be reached on 8:00 a.m. - 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2877

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Zandra V. Smith
Primary Examiner
Art Unit 2877

June 10, 2004